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THE PROBLEM OF U.S. COMPETITIVENESS IN MANUFACTURING: A STUDY BY PAUL R. KRUGMAN AND GEORGE N. HATSOPOULOS*

Summary

Improving the competitive position of American industry is the latest White House prescription for reversing this country's huge trade deficit. This analysis is not universally accepted by either the economics profession or the business community. Even some of the economists and businessmen who applaud the new emphasis question whether the Reagan administration really understands the nature of the problem. Among this group are Paul R. Krugman, professor of economics at the Massachusetts Institute of Technology, and George N. Hatsopoulos, chairman and president of Thermo Electron Corp. and deputy chairman of the board of directors of the Federal Reserve Bank of Boston. Arguing that a turnaround in the trade deficit is inevitable no matter what happens to U.S. competitiveness, they make the case that policymakers, economists and businessmen alike should be focusing on how to facilitate the enormous and costly adjustment that this change will impose on the economy.

Introduction

The debate over the competitiveness of U.S. manufacturing has become increasingly sterile. On one side are business people who look at the declining market shares, poor productivity performance and inferior product quality of

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U.S. manufacturing output in the United States and conclude that the United States may cease to be a manufacturing nation. On the other side are professional economists who look at the relatively rapid growth of manufacturing output in the United States and conclude that there is no evidence of a problem. These two views of the world are so different that each side questions the other's intelligence and judgment.

In fact, both sides are right and both sides are wrong. The business people are right in asserting that something is amiss with the competitive performance of U.S. manufacturing, but wrong in believing that this can lead to a collapse of our manufacturing sector. The economists are right in arguing that deindustrialization is not an issue, but wrong in dismissing worries over U.S. manufacturing performance.

The U.S. manufacturing sector is not about to disappear because it cannot. Some time well before the end of the century the United States will be forced to pay its way in the world community. By then we will have to produce enough to cover our own domestic consumption as well as pay interest on our rapidly accumulating foreign debt. This means that the current trade deficit will have to turn into a surplus. While trade includes services and commodities as well as manufactures, only manufactures have a realistic chance to produce the required massive swing in trade. The United States, therefore, will remain a manufacturing nation even if there is no improvement in the productivity and quality of its manufacturing. The forcing mechanism will be a dramatic devaluation of the dollar.

Manufacturing in the United States has indeed performed poorly relative to foreign competition. Its productivity growth has lagged, its technological edge has eroded, and its product quality has not kept pace with that of foreign manufacturers. Such poor performance will not prevent the United States from selling its manufactured products if the price is right. It will, however, lower the right price. In order to sell its manufactured goods on world markets, the United States may have to lower their price so much that worsened terms of trade will cut deeply into the U.S. standard of living. The right question, therefore, is: at what price will the mandatory reversal of the trade deficit be accomplished?

Growth of U.S. Manufacturing in the Past

Table 1 presents some key statistics on the growth of U.S. manufacturing since 1969. Peak years in the business cycle are shown to minimize cyclical effects.

The first line in the table shows manufacturing output as a percent of gross domestic product. This share has steadily declined. Until 1980, however, the decline was almost entirely due to a decline in domestic demand rather than foreign competition. As the second line shows, U.S. trade in manufacturing during the 1970s was roughly balanced, and thus the share of manufactures in U.S. production was almost exactly the same as their share in U.S. demand.

It is also notable that the declining share of manufactures in demand did not reflect a declining preference by consumers for manufactured goods.

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The third line of the table shows the share of manufactured goods in output in constant dollars. This share was stable during the 1970s, indicating that the volume demand for manufactures grew as rapidly as overall demand. The declining share of manufactures in nominal GDP was thus entirely due to a lower rate of inflation in manufacturing than elsewhere resulting from the faster productivity growth in the manufacturing sector.

Table 1
Indicators of U.S. Manufacturing Performance
Percent of GDP

	Business Cycle Peak Years			
	1969	1973	1979	1985[a]
Manufacturing Output (Current Dollars)	26.9	24.3	22.8	20.1
Manufacturing Trade Balance	0.2	0.0	0.2	-2.6
Manufacturing Output (Constant 1982 Dollars)	22.3	22.9	22.2	21.9

[a]Most recent year for which data available. The expansion that began in 1983 continued into 1986.
Source: *Survey of Current Business*

After 1980, U.S. manufacturing trade plunged sharply into deficit. Surprisingly, the constant-dollar manufacturing share has not fallen much, reflecting an apparent shift in domestic volume demand toward manufactures. However, the growing trade deficit has created the impression that U.S. industry has suddenly lost its ability to compete. Such an impression is incorrect. First, we shall show that U.S. competitiveness has not declined suddenly but has been declining gradually over a long period of time. We shall also show that it is inevitable that U.S. manufacturing will grow sufficiently fast to reverse the current trade deficit and turn it into a surplus.

U.S. Competitiveness in Manufacturing

The most obvious indicator of U.S. competitiveness in manufacturing is the raw trade balance. This indicator by itself, however, can be misleading. A decline in demand for manufactures abroad can lead to a trade deficit by reducing U.S. exports, even if U.S. firms remain competitive. This possibility is the basis of an influential but misleading view that the failure of the rest of the world to expand their economies is the principal cause of the U.S. trade deficit. Conversely, as we shall see, balanced trade may obscure deeper problems.

Another indicator used in many studies is the U.S. share of manufactured exports of industrial countries. We regard this measure as inadequate, however, for at least two reasons. First, it neglects the import side. As the U.S. trade deficit grew larger, the surge in the share of imported manufactures was even more striking than the decline in U.S. exports -- one of the reasons why insufficient foreign demand cannot be the principal cause of the trade deficit. Second, asymmetries in the pattern of world trade can bias the result. A slump in Western Europe would affect the exports of European Community countries more than those of the United States and thus would raise the U.S. share of world exports; we could not regard this as a gain in competitiveness.

A third alternative might be to measure the U.S. share of world production of manufactures. This share has actually risen in the 1980s. Unfortunately, this measure is also flawed. World markets are far from perfectly integrated. Since demand in the United States has risen more rapidly than demand in the rest of the world, demand for U.S. manufactures has also tended to rise more quickly than demand for foreign manufactures, even though U.S. firms have done less well in each market than their foreign competitors. This explains the peculiar fact that from 1980 to the present, U.S. manufacturing output has risen more rapidly than output of other nations even though U.S. firms have been losing shares in every market.

The Market Share Index - We dealt with the difficulties mentioned above as follows: First, we calculated separately the U.S. share of total real sales of manufactures in the United States and in the rest of the world. Then we defined, as our market share index, the ratio of actual U.S. sales to what those sales would have been if the U.S. share in each market had remained the same as it was in a base year.

Chart 1 shows how this index for base year 1980 has behaved since 1970. During the 1970s the U.S. market share index was relatively stable. Imports were an increasing share of U.S. consumption, but the U.S. share of foreign markets was rising at a comparable rate as world markets became increasingly integrated. Since 1980 the index has clearly taken a downward trend. This decline results from a sharp increase in the import share in the United States, and a less dramatic but still noticeable decline in the U.S. share of foreign markets.

Despite the decline in the market share index, U.S. manufacturing production actually rose much more rapidly than that of the rest of the world after 1980. The reason was that the U.S. market, in which U.S. firms have a large share, grew much faster than the market abroad, where the U.S. share is small.

The size of the decline in our market share index -- about 8 percent -- may seem rather small. It says that if U.S. manufacturing had been able to maintain its 1980 market shares, U.S. manufacturing output in 1985 would have been 8 percent larger than in fact it was. However, for an economy like that of the United States, which is still not highly dependent on trade, a decline in the market share index of this size does, in fact, represent a significant shift. We will show that restoring the U.S. market share, and moving it up to levels that allow us to balance our current account, will be a substantial burden on the U.S. economy.

The Long-Term Decline of U.S. Competitiveness - The decline in our market share index for the United States since 1980 coincides with the rise in the dollar, and a natural reaction is to attribute one entirely to the other. Thus, one might be tempted to argue that there is nothing fundamentally wrong with U.S. competitiveness and that all that is necessary is to get the dollar back down.

We do not accept this view. While the strong dollar played a key role in the abrupt deterioration of the U.S. market share, the stability of that market share index during the 1970s is misleading. The dollar declined a great deal from the beginning to the end of that decade as exemplified by the behavior of the yen-to-dollar exchange rate shown in chart 2. It is possible, and

we believe likely, that the United States was able to maintain a stable market share only by making its labor and goods progressively cheaper relative to those of other nations.

The strongest evidence for this view comes when we compare the United States with its most dynamic competitor, Japan. First, chart 3 shows an identically constructed market share index for Japan. Not surprisingly, this index shows a huge upward trend throughout the period, as Japan's share of world markets rose.

Now, we might have expected that in order to gain market share so dramatically, Japan would have had to cut its prices and, therefore, raise wages by less than its productivity growth. In fact, the opposite was true. Chart 4 compares unit labor costs in the United States and Japan. Over the 1970s, Japan was able to increase its market share sharply while that of the United States was flat, even though unit labor costs in Japan were rising relative to those in the United States. This bilateral comparison is also borne out by multilateral indexes; for example, from 1970 to 1980 the International Monetary Fund's measure of U.S. relative unit labor costs fell by 38 percent.

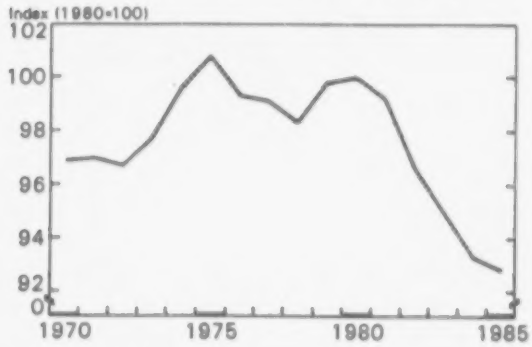
The U.S. manufacturing sector, then, seems to have been able to hold onto its market share only in an environment of steadily declining unit labor costs relative to its competitors. Since, at the same time, U.S. productivity growth lagged far behind that of other countries, U.S. real wages during the 1970s had to rise much less rapidly than those elsewhere. Chart 5 shows once again the comparison with Japan: U.S. productivity growth has lagged far behind Japan's, and probably by now it has fallen behind in absolute terms. What is equally striking, however, is that during the 1970s real wages in the United States lagged even more than U.S. productivity (chart 6).

Why did U.S. firms need a progressive cheapening of their relative labor costs in order to hold onto their markets? Here is where the perceptions of the business community become crucial. Observer after observer has noted a declining U.S. lead in technology and a growing notoriety for inferior product quality. Furthermore, there is evidence that the productivity lag of the United States was most pronounced precisely in the sectors where international competition is most intense. Thus, U.S. firms could hold their own only by competing on the basis of increasingly cheap labor relative to other industrial countries. The root causes of this poor performance are many. It would be hard, however, to expect U.S. manufacturers to do better than they did, given the staggering difference in investment per employee between the United States and Japan, shown in chart 7.

From 1980 to 1985 the historic decline in U.S. relative unit labor costs was temporarily reversed by the rise in the dollar. This rise, of course, led to a fall in market shares, which in turn was the principal cause of the massive U.S. trade deficit. The subsequent decline of the dollar has brought unit labor costs roughly back to their 1970s level against Japan and Europe. However, if the underlying ability of U.S. firms to sell their products has continued to decline -- and there is every reason to believe that it has -- restoring the old position will not be enough. The dollar will have to fall enough to bring U.S. relative labor costs to levels substantially below those of the 1970s just to restore its market share to the 1980 level, while, in order to balance its current account, the United States will have to achieve market shares well above those of the recent past.

Chart 1

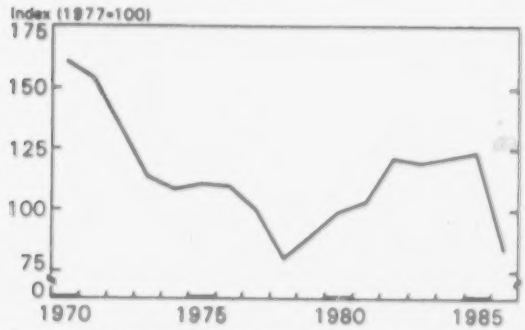
Market Share Index for U.S. Manufacturing



Source: Authors' calculations.

Chart 2

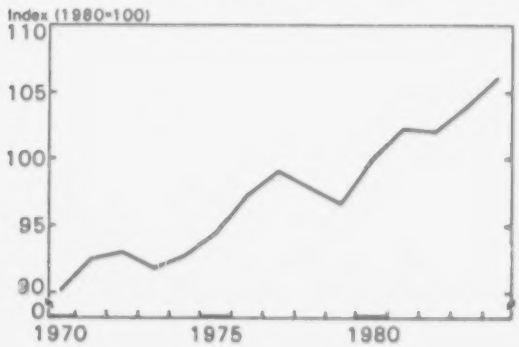
Yen per Dollar Exchange Rate



Source: U.S. Bureau of Labor Statistics, *International Comparisons of Manufacturing Productivity and Labor Cost Trends, 1985*. Values for 1986 estimated by authors.

Chart 3

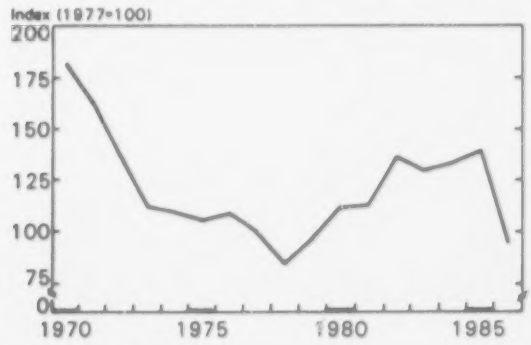
Market Share Index for Japanese Manufacturing



Source: Authors' calculations.

Chart 4

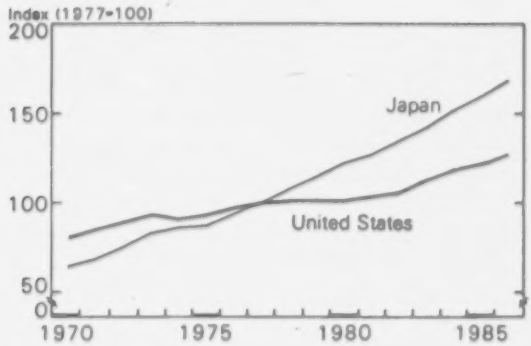
Unit Labor Cost Ratio: United States to Japan



Source: See Chart 2.

Chart 5

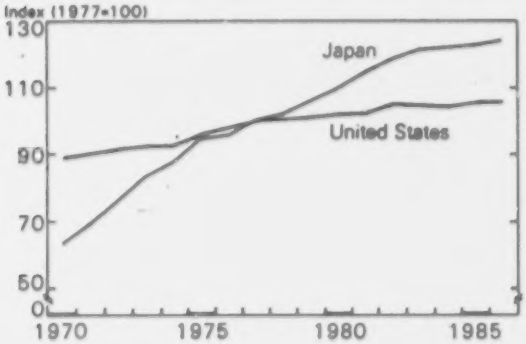
Productivity in Manufacturing



Source: See Chart 2.

Chart 6

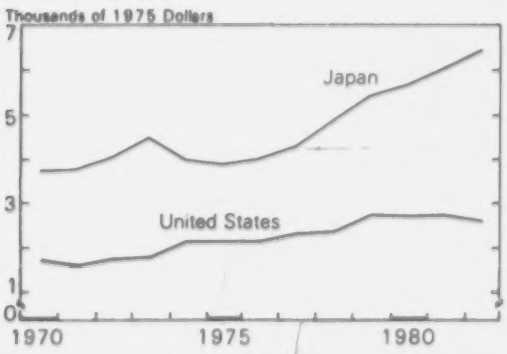
Real Compensation per Hour in Manufacturing



Source: See Chart 2.

Chart 7

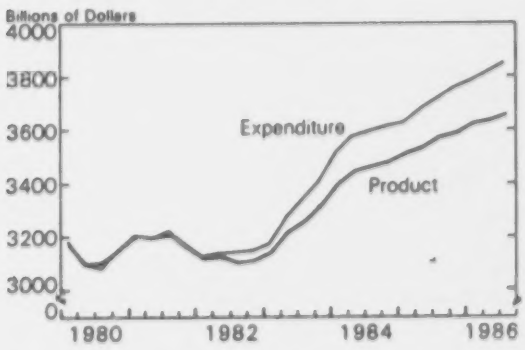
Manufacturing Annual Fixed Investment per Employee



Source: Organization for Economic Cooperation and Development.

Chart 8

U.S. Gross Domestic Product and Gross Domestic Expenditure



Source: U.S. Bureau of Economic Analysis.

Prospects for Future Growth in U.S. Manufacturing

The prospect of an ever-worsening deficit in manufacturing is fundamentally impossible, the key reason being that the worsening of the balance since 1980 has not been offset by an improved U.S. balance in any other sector. Table 2 shows that the decline in the U.S. manufacturing trade balance and the decline in the overall balance on current account were approximately equal. Thus, the United States compensated for its manufacturing trade deficit, not by selling more of something else, but by running down its overseas investments and by borrowing from foreigners. This can go on for a few years, but not indefinitely. The United States has already shifted from being the world's largest creditor to being its largest debtor. Given the size of the U.S. economy, the U.S. debt is not yet a problem; but if the trade deficit were to remain at its present level relative to GNP, within a decade the ratio of debt to GNP would be as high as that of Brazil and a major concern. This is not a feasible outcome, however. Sooner or later a reluctance of foreigners to continue to rapidly increase their holdings of U.S. debt instruments will force a decline in the dollar large enough to enable U.S. firms to sell on world markets. Indeed, this has already begun to happen.

Table 2
Balance on Current Account and Components
Percent of GDP

	Business Cycle Peak Years			
	1969	1973	1979	1985[a]
Balance on Current Account	.04	.53	-.04	-2.97
Merchandise Trade:				
Manufacturing	.18	.02	.17	-2.61
Nonmanufacturing	-.12	.05	-1.29	-.53
Services:				
Factor Income	.63	.90	1.26	.64
Travel and Transportation	-.18	-.24	-.12	-.28
Royalties and Fees	.19	.21	.22	.13
Finance, Insurance, and Professional Services	—	.03	.02	.14
Unilateral Transfers	-.66	-.44	-.30	-.45

[a] Most recent year for which data available. The expansion that began in 1983 continued into 1986.
Source: *Survey of Current Business.*

In principle, the United States could balance its international accounts even while experiencing growing trade deficits in manufacturing if it were able simultaneously to sharply increase its other exports, such as services. Some would argue that this would be a bad thing -- that an economy dependent on service exports is less viable than one based on exports of manufactures. This argument is moot, however, since there is no reason to believe that service exports will play ary significant role in closing the U.S. current account deficit.

Trade in services may be divided into two categories. The first and largest is income earned on overseas investments. The United States has traditionally run a substantial surplus in this category, but this surplus has declined sharply and will soon become a deficit as the United States goes

deeper into foreign debt. The second category includes travel and transportation services such as tourism, royalties and fees, and professional services such as finance, insurance, consulting, and data processing. It is this category we have in mind when we talk of a service-exporting economy. The components of this category are shown in table 2. In 1985 they totaled less than 1 percent of the balance in manufacturing. Each is very small and none shows a discernible trend.

The fact is that despite substantial media attention, trade in services -- real services, not earnings on past overseas investments -- is a minor aspect of world trade. There is simply no prospect that an economy as large as that of the United States could offset a large manufacturing trade deficit with service exports. So the United States cannot run ever deeper into manufacturing deficit. It will be forced to balance its current account by improving its trade balance in merchandise. While some of this improvement might come from agriculture, essentially manufacturing trade will have to bear the brunt of the improvement. This will simply be the converse of the experience since 1980, when the deterioration of the current account was matched one-for-one by manufacturing's plunge into deficit.

Manufacturing trade will, in fact, have to do more than simply return to the near-balance of the 1970s. Manufacturing trade must move into substantial surplus. The reason is that the United States is rapidly accumulating foreign debt. If the United States is to restore current account balance, it must run a non-interest current account surplus large enough to service that debt -- just as Brazil and Mexico do today. The main component of the surplus will almost surely be a trade surplus in manufactures.

In an effort to make our argument more concrete, we have developed a model of the U.S. economy expressly designed to estimate the role that manufacturing has to play in bringing about a balance on current account. The model is briefly described in the final section of the paper. The results obtained are shown in table 3. In each of the last three columns we have supposed that the U.S. current account moves into balance by a specified date -- 5, 10, or 15 years from now. We suppose that the trade deficit declines linearly and moves into surplus from 1986 onward at a rate just sufficient to achieve that target, taking into account the growing U.S. debt to foreigners along the way. We then calculate the trade balance in manufactures that will be necessary to achieve an overall current account balance. The table makes it clear that if the United States is not to experience explosive growth in foreign debt, our trade in manufactures must move from huge deficit to substantial surplus.

Table 3

Trade Surplus Required to Bring the U.S. Current Account into Balance

Billions of Dollars

Year	1985	Amount Required to Balance Current Account by Target Year: 1991	1996	2001
Nonfactor Current Account Balance (Balance of Payments Concept)	-142.6	21.6	49.6	74.2
Manufacturing Trade Balance	-101.4	62.1	102.5	143.3
Assumptions: Real Annual Growth in GDP			2.5%	
Inflation Rate			3.0%	
Real Interest Rate			4.0%	

Source: Authors' calculations

The Problem

We have now argued that the United States will not cease to be a manufacturing nation; indeed, it will experience a sharp reversal of its slide into manufacturing deficit, becoming a net exporter of manufacturing by sometime in the 1990s. Doesn't this mean that worries about the manufacturing sector are therefore misplaced?

The answer is no. We have asserted that a restoration of U.S. balance in manufacturing trade must take place, but we have not yet explored the costs of that restoration. The problem facing the United States is that the costs of moving into manufacturing trade surplus will be very substantial.

Even if there were no long-term problems with manufacturing performance, the United States would face a difficult transition period. In recent years this country has taken advantage of capital inflows and an overvalued dollar to engage in a consumption boom that has far outstripped the growth in our real production. We are now faced with the necessity of bringing our spending back in line with our income, implying much slower growth in consumption in the future than in the past.

The longer-term issues of U.S. performance in manufacturing will reinforce these costs. Because of U.S. problems with productivity, technology, and quality, in order to balance U.S. manufactures trade, the dollar must fall relative to other currencies substantially below historical levels. Exacerbating this problem will be the damage done to U.S. market position by the sustained strength of the dollar; markets lost during the early 1980s will not easily be regained. To restore the U.S. position will probably require not simply a fall of the dollar to a long-run sustainable level, but a period of "corrective undervaluation" that allows the United States to regain markets.

The focus of debate, therefore, should not be on whether the United States will cease to manufacture goods -- it won't. It should be on how this country is going to cope with the strains and minimize the damage as the artificial prosperity of the mid-1980s comes to an end.

National Income and Expenditure - The required squeeze on U.S. resources can be best understood by comparing two numbers: real gross domestic product (GDP), and a less familiar number that we can call real gross domestic expenditure (GDE). GDE is the total quantity of goods and services purchased by U.S. residents, whether for consumption, government uses, or investment. (The same concept is referred to in international monetary theory as absorption.)

Chart 8 compares the growth in U.S. GDP with that of GDE from 1980 to the third quarter of 1986. The more rapid growth of GDE was made possible by two factors: a growing current account deficit, and an improvement in U.S. terms of trade. Neither is sustainable. The current account deficit must eventually end, and the fall in the dollar that will accomplish this will worsen the U.S. terms of trade. Thus, whereas in the first half of the 1980s U.S. real spending could grow faster than U.S. real production, in the future the reverse must be true.

Furthermore, the extent of the required downward adjustment will be larger than the cumulative effects of the divergence between GDP and GDE from 1980 to 1986, which resulted in a difference between the two of 5.4 percent.

Most directly, the United States will be a major debtor by the time current account balance is restored, requiring that the non-factor current account balance be in surplus, not in deficit as in 1980; to achieve this surplus will require a weaker dollar, and hence the debt service burden will be reinforced by worsened terms of trade. At the same time, the United States faces what looks like persistent weak demand in important export markets, due to the Third World's debt problems and European unemployment; this will require a still lower dollar to achieve any given trade surplus, and hence a greater drag in terms of trade. Finally, the microeconomic problems we discuss below mean that the U.S. manufacturing sector needs even lower relative labor costs, and hence an even weaker dollar, than that required by the factors we have mentioned so far.

The future squeeze on resources available for U.S. investment and consumption, then, will be significantly larger than the 5.4 percent "bonus" enjoyed in 1986. Our simulation exercises, reported subsequently, suggest that the cost of restoring competitiveness may exceed 6 percent of GDP. We regard these estimates as relatively optimistic.

Saving and Investment - The problem of a squeeze on U.S. resources is exacerbated by the problem of financing investment. In recent years, capital inflows have enabled the United States to maintain net investment despite very low national saving. The relevant and familiar facts are given in table 4. The U.S. saving share has declined sharply because of massive dissaving by the federal government. Investment could be maintained only because capital inflows have filled the gap.

Table 4
Sources of Net Investment in the United States
Percent of GDP

	Business Cycle Peak Years			
	1969	1973	1979	1985[a]
Net Investment	7.8	9.0	7.7	5.7
Net National Saving and Statistical Discrepancy	8.0	9.6	7.8	2.8
Foreign Capital Inflow	−.2	−.6	−.1	2.9

[a]Most recent year for which data available. The expansion that began in 1983 continued into 1986.
Source: *Survey of Current Business*.

With the end of capital inflows, this solution will no longer work. A sharp cut in the ratio of investment to GDP hardly seems possible; indeed, given dismal U.S. productivity performance, a rise in this ratio seems called for. Even to hold investment in line with GDP, however, national saving must rise. Otherwise real interest rates will rise, choking off investment and further worsening the competitive position of U.S. manufacturing.

This means that as the resources available for domestic consumption and investment are squeezed by the need of the United States to restore a balance on current account, all, and probably more than all, of the squeeze must be borne by consumption.

Microeconomic Problems - The adjustment problem of the United States may be significantly worsened by two kinds of microeconomic problems.

On one side, there is the long-term poor performance that we noted above. During the 1970s the United States seemed to need a progressive reduction in labor costs relative to other countries in order to hold its own in world markets. There is every reason to believe that under the dust cloud thrown up by currency gyrations from 1980 to 1985, this long-term problem continued. Thus, all other things being equal, the United States would need a dollar decline not simply large enough to restore its relative unit-labor-cost position of 1980, but large enough also to make up for the deterioration in the U.S. technological and quality position in the interim.

There is also widespread concern among businessmen -- concern that we share -- that the huge overvaluation of the dollar may have done long-term damage to the U.S. competitive position. During the period of the strong dollar, foreign firms have established "beachheads" in U.S. markets that they may be able to maintain even with a lower dollar; conversely, U.S. firms have abandoned markets that they will now find too costly to recapture even with the dollar back to its historical levels. Multinational firms have shifted sourcing out of the United States, and will not always shift it back just because previous exchange rates have been restored. In the currently fashionable jargon of economists, we suspect that there may be substantial "hysteresis" in the trade balance.

Both these microeconomic arguments indicate that the dollar will have to fall further than anyone has yet been willing to contemplate seriously. We need to think, not in terms of what the dollar used to be worth, but of where the declining trend of the 1970s would have put us by 1990; and from this value we need to subtract a corrective undervaluation sufficient to undo the damage of the 1980-1985 overvaluation. The further the dollar must fall, however, the greater the drag of the terms of trade on gross domestic expenditure.

The Protectionist Fallacy - The costs of restoring U.S. current account balance are going to be high. Many people will doubtless look for an easy out, a way to avoid these costs. A tempting answer will be protectionism: use tariffs and import quotas to roll back the trade deficit, and thus avoid hard choices on taxes, spending, and consumption. In fact, however, protectionist measures will only make the adjustment harder.

The central reality is that the need to bring expenditures in line with domestic production cannot be avoided. Protectionist measures can only shift expenditures from one good to another; if overall expenditures are too high, they must be reduced, regardless of U.S. trade policy.

All that protection can do is shift demand from foreign to domestic goods. For this purpose, however, it is far better to rely on dollar depreciation. Protectionist measures are inefficient because they distort incentives; they open the door to political abuse; and they will inevitably provoke retaliation from abroad.

In discussions of the problem of U.S. competitiveness, it is too often assumed that those who are concerned about competitiveness are always protectionists. This is just another example of the sterility into which the debate has fallen. The United States has a real competitive problem, but protection cannot solve it.

Restoring Competitiveness - Although several factors have contributed to the enormous problems the United States now faces, a principal one has been the insidious and chronic decline of U.S. manufacturing competitiveness. Repeated devaluation of the dollar, no matter how necessary to arrest the explosive accumulation of foreign liabilities of the United States, is not a satisfactory solution. A short-term decline in the standard of living of the American people is inevitable. But, unless we restore the competitive position of our manufacturing industry, the short-term decline will become permanent.

Many things will have to change in order to restore industrial competitiveness, ranging from attitudes and education to rates of capital formation. But none is more essential, yet more difficult to achieve, than to bring the rate of net national saving somewhere between what it was in the United States and what it is in Japan. This certainly means a doubling and possibly a quadrupling of the current rate of net national saving.

Adjustment Scenarios

As mentioned earlier, we have developed a model that allows us to illustrate plausible paths of the U.S. economy under various scenarios leading to restoration of a balance on current account. This model is deliberately based on optimistic assumptions.

In particular, the model does not take account either of a further decline in the competitiveness of U.S. manufacturing or of the long-term damage done by the strong dollar in the early 1980s. Thus, our results represent the most favorable to be expected. For example, we suspect that the dollar will have to decline more than our calculations show, the deterioration in the terms of trade will be larger, and, therefore, the required trade surplus in manufactures in real terms will have to exceed what we report.

Structure of the Model - The model (described in detail in the appendix) is essentially a simple general equilibrium model with only one domestic factor of production and four goods: domestic and foreign manufactures and nonmanufactures. It takes account of both substitution between manufactures and nonmanufactures, and substitution between domestic and foreign goods of each type. It also takes account of the input-output relations in the economy so that direct demand for manufactures indirectly produces some demand for nonmanufactures, and vice versa.

The parameters of the model represent a mix of plausible guesses drawn from the literature and real data. We use the 1977 input-output table to derive the input-output structure, and calibrate the model so that it reproduces actual numbers of 1985.

The model allows us to specify two exogenous variables. First is the real gross domestic product, that is, the economy's productive capacity, and second, the non-factor current account. Given these, we can solve for the level of real gross domestic expenditure and the real exchange rate that will produce the specified results. We can also determine the breakdown of the trade balance betwen manufactures and nonmanufactures, as well as the domestic output of each kind of good.

Hypothetical Scenarios - Table 5 reports the results of three scenarios constructed using our model. Several common assumptions are maintained across

the scenarios. First, inflation is assumed to be 3 percent and the real interest rate 4 percent. Second, the non-factor current account is assumed to move into surplus linearly so as to balance the overall current account by a target date. In the first column the target date is five years from 1986; real GDP growth is assumed to be 2.5 percent per year. In the second column the target year is again five years from 1986 but GDP is assumed to grow at 3 percent per year. In the third column the target year is 10 years from 1986 and GDP is assumed to grow at 2.5 percent as in the first scenario.

Table 5

Three Hypothetical Scenarios

Resulting in a Zero Current Account Balance by Target Year

		Target Years		
	1985	1991	1991	1996
Percent of Gross Domestic Product:				
(1) Nonfactor Current Account	−3.6	.4	.4	.7
(2) Manufacturing Trade Balance	−2.6	1.1	1.1	1.3
		1986 to Target Year		
	1980–85	1991	1991	1996
Percent Change:				
(3) Terms of Trade	16.9[a]	−20.2	−20.1	−21.1
Average Annual Growth Rates, Percent:				
(4) Gross Domestic Product	2.5	2.5[b]	3.0[b]	2.5[b]
(5) Gross Domestic Expenditures	3.5	1.2	1.7	1.8
(6) Manufacturing Output	3.1	4.3	4.8	3.4
(7) Non-manufacturing Output	2.4	2.0	2.5	2.3

[a] Excludes agricultural export prices and petroleum import prices.

[b] By assumption. Inflation rate assumed to be 3 percent, real interest rate 4 percent.

Source: Authors' calculations.

The first line of the table shows the non-factor current account surplus that will be required in each case as a share of GDP. The important point here is that the United States will have to adjust well past its 1980 position, which was one of a significant deficit in the non-factor current account. If the current account is to be in balance by 1991, the surplus will have to be nearly one-half of 1 percent of GDP. The longer the adjustment is allowed to take, the larger the accumulation of foreign debt and thus the larger the required non-factor surplus.

The second line of the table shows the required surplus in manufacturing trade as a share of GDP. This line makes the point that the required improvement in the trade position must come largely through an improvement in manufacturing trade.

The third line of the table shows the required decline of the terms of trade from current levels. As we have explained, we regard this number as a likely underestimate, perhaps a serious one, of the actual decline that will be required.

The terms-of-trade change will increase the demand for U.S. goods. Since productive capacity is limited, domestic demand will have to grow more slowly than GDP. Lines 4 and 5 of the table show the rates of growth of real GDP and

GDE. Note that if the current account is to be balanced by 1991, real domestic demand must grow less than half as rapidly as real domestic output.

Finally, lines 6 and 7 show the effect on the structure of the economy of the combination of slow growth in domestic demand and improving trade balance. In order to balance its payments, the United States must experience a significant reindustrialization, with manufacturing output growing significantly faster than the nonmanufacturing sector.

The picture presented by these scenarios is far from catastrophic (although we suspect that the true picture may be worse). Nonetheless, it is fairly bleak. We have assumed a path in which output grows fast and smoothly, without any recession, and in which the United States is, in fact, able to regain markets without getting caught in a trade war or any other sort of crisis. Nonetheless, we find that our international competitive problem may easily be enough to prevent any rise in living standards for quite some time.

Conclusion

The United States has a serious international competitive problem and that problem is largely one of competitiveness in manufacturing. The problem is, however, not one of impending deindustrialization. Rather, it is that the inevitable improvement in the U.S. trade balance, which will necessarily come mostly in manufactured goods, will impose serious costs on the U.S. economy. These costs will be higher than they would otherwise be because of the poor performance of U.S. manufacturing in international competition.

It is important that the United States begin to face up to the magnitude of the adjustment problems ahead. As a first step we need to get away from the sterile debating positions that have led discussions of the state of U.S. manufacturing to an impasse. It is easy for businessmen to fault economists for their lack of contact with what is really happening; it is equally easy for economists to fault businessmen for their lack of understanding of how the pieces of the picture fit together. We hope this paper helps convince both sides to listen to what the others are saying. Unless this happens, the United States will not be able to face the coming difficulties with the foresight they deserve.

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Appendix: Structure of the Simulation Model

The numerical exercises reported in this paper were derived from a simple general equilibrium model calibrated to U.S. data. This model allows us to keep track of the changes in relative prices, resource allocation, and real income associated with changes in the trade balance.

The model simplifies issues in four major ways. First, specificity of resources to particular sectors is ignored: the economy is treated as having only one domestic factor, which can produce value added in any sector. Second, differences in the composition of different kinds of demand are ignored:

investment, consumption, and government purchases are assumed to embody the same mix of manufactured (MAN) and nonmanufactured (NON) goods, and the same ratio of domestic to foreign products within each category. Third, the model is highly aggregated, with only four goods recognized: domestic manufactures (DMAN), foreign manufactures (FMAN), domestic nonmanufactures (DNON), foreign nonmanufactures (FNON). Finally, continuous maintenance of normal employment of resources is assumed: the possibility of a recession that leaves resources underutilized is ignored.

Despite these simplifications, the model is by no means trivial. We keep full account of input-output links between sectors, and impose a structure that forces us to tell a fully consistent story about the relationships among all elements of the economy.

Demand in the model is represented by a two-level CES (constant elasticity of substitution) structure. At the top level, the economy's true absorption of goods and services -- real gross domestic expenditure -- is a CES function of absorption of manufactured and nonmanufactured goods:

$$GDE = GDE(MAN,NON) \tag{1}$$

A low elasticity of substitution of 0.1 is assumed at this level. The constant terms, here and elsewhere, are chosen so as to reproduce the actual values for 1985.

At the second level, the aggregates of manufactured and nonmanufactured goods are themselves CES functions of domestic and foreign goods of each type:

$$TMAN = TMAN(DMAN,FMAN) \tag{2}$$

$$TNON = TNON(DNON,FNON) \tag{3}$$

where TMAN, TNON are total supplies of each type of good to the economy; DMAN, DNON are domestic outputs; and FMAN, FNON are imports. The elasticity of substitution between domestic and foreign goods is assumed equal to 2 in manufacturing, 0.1 in nonmanufacturing.

Total demand for manufactures and nonmanufactures in the economy reflects both direct demand for final use and exports (XMAN and XNON) and direct demand by domestic producers:

$$TMAN = XMAN + MAN + a_{11}DMAN + a_{12}DNON \tag{4}$$

$$TNON = XNON + NON + a_{21}DMAN + a_{22}DNON \tag{5}$$

where the coefficients a_{ij} are taken from the 1977 input-output table.

Export demand depends on the price of each kind of good relative to foreign prices:

$$XMAN = XMAN(PMAN/PFMAN) \tag{6}$$

$$XNON = XNON(PNON/PFNON) \tag{7}$$

The elasticity of foreign demand for manufactured goods is set equal to 1.5, while that for nonmanufactures is set equal to 0.5.

Prices of manufactures and nonmanufactures aggregates are the cost-minimizing solutions, given the prices of domestic and foreign goods. The price of domestic goods (PDMAN and PDNON) reflects the prices of value-added, set equal to one, and the prices of inputs of the manufactured and nonmanufac- tured aggregates (PMAN and PNON):

$$PDMAN = (1 - a_{11} - a_{21}) + a_{11}PMAN + a_{21}PNON \quad (8)$$

$$PDNON = (1 - a_{12} - a_{22}) + a_{12}PMAN + a_{22}PNON \quad (9)$$

The prices (PFMAN and PFNON) of foreign goods depend on the exchange rate E:

$$PFMAN = PFMAN(E) \quad (10)$$

$$PFNON = PFNON(E) \quad (11)$$

We assume that the elasticity of both foreign prices to the exchange rate is the same; given this, the U.S. adjustment path does not depend on what this elasticity is. For the sake of concreteness, however, an elasticity of 0.6 is assumed.

Finally, we define two useful aggregates. First is the U.S. balance in goods and nonfactor services (B), defined as

$$B = PMAN*XMAN + PNON*XNON - PFMAN*FMAN - PFNON*FNON \quad (12)$$

Second is real GDP, defined as the sum of value-added:

$$GDP = (1 - a_{11} - a_{21})*DMAN + (1 - a_{12} - a_{22})*DNON \quad (13)$$

The model allows us to solve for B and GDP given GDE and the exchange rate E. We have inverted this procedure. We assume a growth rate for real GDP and calculate a path for B that yields current account balance after a specified number of years. We then solve the model for the levels of GDE and E that yield these results. As a byproduct the model also then yields domestic output of manufactured and nonmanufactured goods, and the trade balance by type of good.

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